CLAIMS

What we claim is

1. In a process of forming a canola protein isolate wherein:

canola seeds are processed to form a canola protein meal,

the canola protein meal is extracted to form an aqueous protein solution,

the aqueous protein solution is concentrated, and

the canola protein isolate is recovered from the concentrated aqueous protein solution, the improvement which comprises effecting at least one process step during said process which results in a canola protein isolate having a decreased colour.

2. The process of claim 1 wherein said at least one process step involves the processing of said seeds.

3. The process of claim 2 wherein said processing of seeds includes inactivation of myrosinase in said seeds.

4. The process of claim 1 wherein said at least one process step involves the extraction step.

5. The process of claim 4 wherein said extraction step is effected using at least one of extraction of the canola protein meal in the presence of an antioxidant, extraction of low temperature desolventized meal, extraction of air-desolventized meal, and treatment of canola protein solution with at least one colouring component adsorbing agent.

6. The process of claim 1 wherein said at least one process step involves the concentration step.

7. The process of claim 6 wherein concentration step is followed by diafiltration of the concentrated aqueous protein solution

8. The process of claim 1 wherein said at least one process step involves the meal.

9. The process of claim 8 wherein said canola protein meal is solvent extracted.

10. The process of claim 1 wherein said at least one process step involves the recovered canola protein isolate.

11. The process of claim 10 wherein said canola protein isolate is solvent extracted.

12. The process of claim 1 wherein said canola protein isolate is recovered from the concentrated aqueous protein solution by adding the concentrated aqueous solution to chilled water to form a protein micellar mass, and separating the protein micellar mass from supernatant.

13. The process of claim 12 wherein said supernatant is processed to recover additional canola protein isolate therefrom by concentrating the supernatant, subject to concentrated supernatant to diafiltration and recovering canola protein isolate from the diafiltered supernatant.

14. A process of preparing a canola protein isolate from canola oil seed meal, which comprises:

(a) extracting the canola oil seed meal and to cause solubilization of the protein in the canola oil seed meal to form an aqueous protein solution having a pH of about 5 to about 6.8 by using an aqueous salt solution containing an antioxidant,

(b) separating the aqueous protein solution from residual oil seed meal,

(c) increasing the protein concentration of said aqueous protein solution while maintaining the ionic strength substantially constant by use of a selective membrane technique to provide a concentrated protein solution,

(d) diluting said concentrated protein solution into chilled water having a temperature of below about 15°C to cause the formation of discrete protein micelles in the aqueous phase,

(e) settling the protein micelles to form an amorphous, sticky, gelatinous, gluten-like protein micellar mass, and

(f) recovering the protein micellar mass from supernatant, the protein micellar mass having a protein content of at least about 90 wt% (N x 6.25) on a dry weight basis.

15. The process of claim 14 wherein said antioxidant is sodium sulfite or ascorbic acid.

16. The process of claim 15 wherein said antioxidant is present in said aqueous salt solution in an amount of about 0.01 to about 1 wt%.

17. The process of claim 14 wherein said canola oil seed meal is canola oil seed meal which has been air desolventized at a temperature of below about 50°C to remove residual oil extraction solvent.

18. The process of claim 14 wherein said canola oil seed meal is canola oil seed meal which has been desolventized at an elevated temperature below about 100°C to remove residual oil extraction solvent.

19. A process of preparing a canola protein solution from canola oil seed meal, which comprises:

(a) washing said canola oil seed meal with an alcohol,

(b) extracting the washed canola oil seed meal to cause solubilization of the protein in the washed canola oil seed meal to form an aqueous protein solution having a pH of about 5 to about 6.8,

(c) separating the aqueous protein solution from residual oil seed meal,

(d) increasing the protein concentration of said aqueous protein solution while maintaining the ionic straight substantially constant by use of a selective membrane technique to provide a concentrated protein solution,

(e) diluting said concentrated protein solution into chilled water having a temperature of below about 15°C to cause the formation of discrete protein micelles in the aqueous phase,

(f) settling the protein micelles to form an amorphous, sticky, gelatinous, gluten-like protein micellar mass, and

(g) recovering the protein micellar mass from supernatant, the protein micellar mass having a protein content of at least about 90 wt% (N x 6.25) on a dry weight basis.

20. The process of claim 16 wherein the alcohol is ethanol.

21. The process of claim 19 wherein said washing step is effected by dispersing the canola oil seed meal in solvent at a w/v ratio of about 1:3 to about 1:10, stirring the resulting slurry for about 5 to about 60 minutes at a temperature of about 15° to about 45°C, and separating the washed canola oil seed meal from the slurry.

22. The process of claim 21 wherein said slurry is stirred for about 15 to about 30 minutes at a temperature of about 30 to about 75°C.

23. The process of claim 19 wherein said washing effected a multiple number of times until no additional phenolics and/or visible colour is recovered.

24. The process of claim 19 wherein said canola oil seed meal is canola oil seed meal which has been air desolventized at a temperature of below about 50°C to remove residual oil extraction solvent.

25. The process of claim 19 wherein said canola oil seed meal is canola oil seed meal which has been desolventized at an elevated temperature below about 100°C to remove residual oil extraction solvent.

26. A process of preparing a canola protein isolate from canola oil seed meal, which comprises:

(a) extracting the canola oil seed meal to cause solubilization of the protein in the canola oil seed meal to form an aqueous protein solution having a pH about 5 to about 6.8,

(b) separating the aqueous protein solution from residual oil seed meal,

(c) increasing the protein concentration of said aqueous protein solution while maintaining the ionic strength substantially constant by effecting ultrafiltration of the aqueous protein solution to provide a concentrated protein solution,

(d) subjecting the concentrated protein solution to diafiltration,

(e) diluting the diafiltered protein solution into chilled water having a temperature below about 15°C to cause the formation of discrete protein micelles in the aqueous phase,

(f) settling the protein micelles to form an amorphous, sticky, gelatinous, gluten-like protein micellar mass, and

(g) recovering the protein micellar mass from supernatant, the protein micellar mass having a protein content of at least about 90 wt% (N x 6.25) on a dry weight basis.

27. The process of claim 26 wherein said diafiltration is effected using about 2 to about 20 volumes of diafiltration solution.

28. The process of claim 28 wherein said diafiltration is effected using about 5 to about 10 volumes of diafiltration solution.

29. The process of claim 27 wherein said extraction step is effected using an aqueous salt solution having a pH in the range of about 5 to about 6.8 and said diafiltration solution is an aqueous salt solution having the same concentration and pH as the solution used in said extraction step.

30. The process of claim 27 wherein said diafiltration is effected using a membrane having a molecular weight cut-off in the range of about 3000 to about 50,000 daltons.

31. The process of claim 30 wherein said membrane has a molecular weight cut-off of about 5000 to about 10,000 daltons.

32. The process of claim 27 wherein said diafiltration solution contains an antioxidant for at least a portion of said diafiltration step.

33. The process of claim 32 wherein said antioxidant is sodium sulfite or ascorbic acid.

34. The process of claim 33 wherein said antioxidant is used in an amount of about 0.01 to about 1 wt%.

35. The process of claim 26 wherein said extraction step is effected using an aqueous salt solution having a pH of about 5 to about 6.8 and containing an antioxidant.

36. The process of claim 26 wherein said canola oil seed meal is washed with an alcohol.

37. The process of claim 26 wherein said protein micellar mass is dried and the dried canola protein isolate is extracted with an aqueous alcoholic solution.

38. The process of claim 36 wherein said supernatant is concentrated by effecting ultrafiltration of the supernatant to provide a concentrated supernatant and the concentrated supernatant is subjected to diafiltration.

39. The process of claim 38 wherein said diafiltration is effected using about 2 to about 20 volumes of diafiltration solution.

40. The process of claim 39 wherein said diafiltration is effected using about 5 to about 10 volumes of water.

41. The process of claim 39 wherein said diafiltration is effected using a membrane having a molecular weight cut-off in the range of about 3000 to about 50,000 daltons.

42. The process of claim 39 wherein said membrane has a molecular weight of about 5000 to about 10,000 daltons.

43. The process of claim 39 wherein said diafiltration solution contains an antioxidant for at least a portion of said diafiltration step.

44. The process of claim 43 wherein said antioxidant is sodium sulfite or ascorbic acid.

45. The process of claim 44 wherein said antioxidant is used in an amount of about 0.01 to about 1 wt%.

46. The process of claim 26 wherein said diafiltered protein solution is contacted with a colour-adsorbing agent prior to said diluting step.

47. The process of claim 46 wherein said colour-adsorbing agent is polyvinylpyrrolidone.

48. The process of claim 47 wherein said polyvinylpyrrolidone is used in an amount of about 0.5 to about 6 wt%.

49. The process of claim 48 wherein said polyvinylpyrrolidone is used in an amount of about 2 to about 3 wt%.

50. The process of claim 26 wherein the canola oil seed meal is prepared by inactivating myrosinases in canola oil seeds and recovering canola oil from the treated oil seeds to form the canola oil seed meal.

51. The process of claim 40 wherein the canola oil seed meal is air-desolventized at a temperature below about 50°C to remove residual oil extraction solvent.

52. The process of claim 50 wherein the canola oil seed meal is desolventized at an elevated temperature below bout 100°C to remove residual oil extraction solvent.

53. The process of claim 26 wherein said diafiltered protein solution is subjected to a pasteurization step prior to said diluting step.

54. The process of claim 53 wherein said pasteurization step is effected by heating the diafiltered protein solution at a temperature of about 55° to about 70°C for about 10 to about 15 minutes.

55. A process of preparing a canola protein isolate from canola oil seed meal, which comprises:

(a) extracting the canola oil seed meal to cause solubilization of the protein in the canola oil seed meal to form an aqueous protein solution having a pH of about 5 to about 6.8,

(b) separating the aqueous protein solution from the residual oil seed meal,

(c) increasing the protein concentration of said aqueous protein solution while maintaining the ionic strength substantially constant by use of a selective membrane technique to form a concentrated protein solution,

(d) diluting said concentrated protein solution into chilled water having a temperature below about 15°C to cause the formation of discrete protein micelles in the aqueous phase,

(e) settling the protein micelles to form an amorphous, sticky, gelatinous, gluten-like protein micellar mass,

(f) separating the protein micellar mass from supernatant,

(g) drying the protein micellar mass to provide a canola protein isolate having a protein content of at least about 90 wt% (N x 6.25) on a dry weight basis, and

(h) extracting said canola protein isolate with an aqueous alcoholic solution.

56. The process of claim 55 wherein said aqueous alcoholic solution is an aqueous ethanol solution having a volume ratio of ethanol:water of about 2:1 to about 1:2.

57. The process of claim 55 wherein said extraction step is effected by dispersing the canola protein isolate in the aqueous alcoholic solution in an amount of about 5 to about 25 wt%, mixing the resulting slurry for about 30 to about 60 minutes, and separating the extracted canola protein isolate from the slurry.

58. The process of claim 55 wherein said extraction step is repeated until no additional phenolics and/or invisible colourants are removed from the canola protein isolate.

59. A process of preparing a canola protein isolate from canola oil seed meal, which comprises:

(a) extracting the canola oil seed meal to cause solubilization of the protein in the canola oil seed meal to form an aqueous protein solution having a pH of about 5 to about 6.8,

(b) separating the aqueous protein solution from residual oil seed meal,

(c) increasing the protein concentration of said aqueous protein solution while maintaining the ionic strength substantially constant by use of a selective membrane technique to provide a concentrated protein solution,

(d) pasteurizing the concentrated protein solution to form a pasteurized protein solution,

(e) diluting the pasteurized protein solution into chilled water having a temperature below about 15°C to cause the formation of discrete protein micelles in the aqueous phase,

(f) settling the protein micelles to form an amorphous, sticky, gelatinous, gluten-like protein micellar mass, and

(g) recovering the protein micellar mass from supernatant, the protein micellar mass having a protein content of at least about 90 wt% (N x 6.25) on a dry weight basis.

60. The process of claim 59 wherein said pasteurization is effected by heating the concentrated protein solution at a temperature of about 55° to about 70°C for about 10 to about 15 minutes.

61. The process of claim 60 wherein said concentrated protein solution is heated at a temperature of about 60° to about 65°C for about 10 minutes.

62. A process of preparing a canola protein isolate from canola oil seed, which comprises:

(a) treating canola oil seeds to inactivate myrosinases contained in the oil seeds to produce treated oil seeds,

(b) processing said oil seeds to remove canola oil therefrom and produce a canola oil seed meal,

(c) extracting the canola oil seed to cause solubilization of the protein in the canola oil seed to form an aqueous solution having a pH of about 5 to about 6.8,

(d) separating the aqueous protein solution from residual oil seed meal,

(e) increasing the protein concentration of said aqueous protein solution which maintaining the ionic strength substantially constant by use of a selective membrane technique to provide a concentrated protein solution,

(f) diluting the concentrated protein solution into chilled water having a temperature below about 15°C to cause formation of discrete protein micelles in the aqueous phase,

(g) settling the protein micelles to form an amorphous, sticky, gelatinous, gluten-like protein micellar mass, and

(h) recovering the protein micellar mass from supernatant, the protein micellar mass having a protein content of at least about 90 wt% of (N x 6.25) on a dry weight basis.

63. The process of claim 62 wherein the canola oil seed meal is air-desolventized at a temperature below about 50°C to remove residual oil extraction solvent prior to said extracting step.

64. The process of claim 762 wherein the canola oil seed is desolventized at an elevated temperature below about 100°C to remove residual oil extraction solvent prior to said extracting step.